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EXAMINER	
FLOHRE, JASON A	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/581,943	DUPARRE ET AL.	
	Examiner	Art Unit	
	JASON A. FLOHRE	2622	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 May 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4-17 and 19-41* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4-17 and 19-41* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 June 2006* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1-41 have been considered but are moot in view of the new ground(s) of rejection.

Drawings

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the features of claims 35-41 (each of the devices in which the image sensor is integrated) must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner,

the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 1, 2, 4, 9, 17 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kato (United States Patent 5,682,203) in view of Takahashi et al. (United States Patent Application Publication 2001/0026322), hereinafter referenced as Takahashi and further in view of Mates (United States Patent Application Publication 2003/0111593).

Regarding claim 1, Kato discloses an image recognition system comprising regularly disposed optical channels having at least one microlens and at least one detector (photocells 2 and micro-lenses 3 which are regularly disposed in a rectangular array as exhibited in figure 1), which is situated in a focal plane thereof and extracts at least one image spot from a microimage behind the microlens (figure 2 exhibits the image sensor 1 in the focal plane of lens 4 as disclosed at column 5, lines 15-18), optical axes of the individual optical channels having different inclinations in such a manner that they represent a function of distance of the optical channel from a centre of a side of the image recognition system which is orientated towards the image, by means of which a ratio of a size of a field of view to an image field size can be determined

specifically, wherein the pitch of the microlenses differs from the pitch of the detectors in order to ensure a different inclination of the optical axes for the individual channels (figure 1 exhibits wherein the pitch of the microlenses varies stepwise as they move away from the centre of the sensor, while the pitch of the photo-cell remains constant, as disclosed at column 5, lines 6-8. The relation between the pitch of the photo-cells (PV and PH) and the pitch of the micro-lenses (MV and MH) is exhibited in the equations disclosed at column 5 lines 11-14) and wherein at least a part of the microlenses are anamorphic lenses which are different for each individual channel (column 5, lines 48-51 disclose that the curvature and power of the micro-lenses increases stepwise as they move away from the centre of the screen. This means that the lenses are anamorphic in that there is an intentional distortion, as by unequal magnification along perpendicular axes due to the continuous change in pitch of the micro-lenses in the horizontal direction compared to the constant pitch of the micro-lenses in the vertical direction which results in a different number of micro-lenses in the vertical and horizontal directions and therefore a different magnification at the peripheries of the vertical and horizontal axes). However, Kato fails to disclose the at least one detector is used with a sensitivity such that the at least one detector has a pitch that is larger than an active surface area thereof.

However, in a similar field of endeavor Takahashi discloses a solid state imaging device. In addition, Takahashi discloses the at least one detector is used with a sensitivity such that the at least one detector has a pitch that is larger than an active surface area thereof (figure 11 exhibits an array containing pixels with an opening area

3 formed through the light shielding layer, as disclosed at paragraph 64 lines 2-6, which represents an active surface area. The photodiode area, indicated by the cross lines labeled "center of photodiode area" has a pitch that is larger than the opening area 3).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kato by specifically providing the at least one detector is used with a sensitivity such that the at least one detector has a pitch that is larger than an active surface area thereof, as taught by Takahashi, for the purpose of reducing the amount of noise which is caused between pixels.

Kato in view of Takahashi fails to disclose regularly disposed optical channels having at least one microlens and at least one detector that generate an image without employing additional image generating optics.

Mates teaches generating an image without the use of additional optics (figure 1 exhibits an image sensor able to generate an image using only a microlens array and photodetector elements. Paragraph 22 discloses that the system of figure 1 is able to capture an image without the need for additional optics).

Kato in view of Takahashi contains a base process of capturing an image with optical channels and an additional lens which the claimed invention can be seen as an improvement in the ability to reduce the overall form factor of the device.

Mates teaches a comparable process of capturing an image without the need for an additional lens that has been improved in the same way as the invention.

Mates' known improvement could have been applied in the same way to the base process of Kato in view of Takahashi and the results would have been predictable and resulted in an image capturing system with a minimal form factor.

Therefore, the claimed subject matter could have been obvious to a person having ordinary skill in the art at the time the invention was made.

Regarding claim 2, Kato in view of Takahashi and further in view of Mates discloses everything claimed as applied above (see claim 1), in addition, Kato discloses wherein each optical channel detects at least one specific solid angle segment of the object space as corresponding image spot so that a totality of the transmitted image spots on the detector allows reconstruction of the object (it is inherent that each microlens is made to capture a specific segment in order to form an image).

Regarding claim 4, Kato in view of Takahashi and further in view of Mates discloses everything claimed as applied above (see claim 1), in addition, Kato discloses wherein the individual mircolenses differ with respect to decentralization relative to the detector, a focal distance, conical and/or aspherical parameters and hence enable different inclinations of the optical axes (figure 1 exhibits wherein the pitch of the microlenses varies stepwise as they move away from the centre of the sensor, while the pitch of the photo-cell remains constant, as disclosed at column 5, lines 6-8 which allows for different inclinations of the optical axes. The relation between the pitch of the photo-cells (PV and PH) and the pitch of the micro-lenses (MV and MH) is exhibited in the equations disclosed at column 5 lines 11-14).

Regarding claim 9, Kato in view of Takahashi and further in view of Mates discloses everything claimed as applied above (see claim 1), in addition, Kato discloses wherein the individual optical channels have at least one of: (i) different pitch differences between microlens and detector; and (ii) at least one pinhole for correction of distortion (column 5 lines 11-14 disclose two equations which teach that the micro-lenses have a smaller pitch than the photo-detectors. It is also disclosed at column 5, lines 6-8 that the pitch of the micro-lenses varies with the distance from the centre of the substrate).

Regarding claim 17, Kato in view of Takahashi and further in view of Mates discloses everything claimed as applied above (see claim 1), in addition, Kato discloses wherein the detectors are present as at least one of: (i) a CCD, (ii) a CMOS photosensor array, and (iii) a photosensor array comprising a polymer (column 4 lines 42-43 disclose that the photocells may be a CCD).

Regarding claim 26, Kato in view of Takahashi and further in view of Mates discloses everything claimed as applied above (see claim 1), in addition, Kato discloses wherein a pixel is assigned to each optical channel (figure 3 exhibits where a single photocell 22x and color filter 24x are assigned to single microlens 25x creating a single pixel for each optical channel as disclosed at column 1, lines 42-45 and 52).

2. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kato in view of Takahashi in view of Mates and further in view of Beeson et al. (United States Patent 5,521,725), hereinafter referenced as Beeson.

Regarding claim 5, Kato in view of Takahashi and further in view of Mates discloses everything claimed as applied above (see claim 1), however Kato fails to

disclose wherein microprisms which enable different inclinations of the optical axes are integrated in the individual microlenses.

In a similar field of endeavor Beeson discloses an illumination system employing an array or microprisms. In addition, Beeson discloses microprisms which enable different inclinations of the optical axes are integrated in the individual microlenses (that light emanating from each microprism (28) is directed to a corresponding microlens (80) as disclosed at column 2, lines 53-55 and exhibited in figure 2).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kato in view of Takahashi by specifically providing wherein microprisms which enable different inclinations of the optical axes are integrated in the individual microlenses, as taught by Beeson, for the purpose of creating spatially directed light.

3. Claims 6, 7 and 20- 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kato in view of Takahashi in view of Mates and further in view of Applicant's Admitted Prior Art, hereinafter referenced as AAPA.

Regarding claim 6, Kato in view of Takahashi and further in view of Mates discloses everything claimed as applied above (see claim 1), however, Kato fails to disclose wherein the individual microlenses are disposed on a base which has a convex or concave configuration and hence enable different inclinations of the optical axes.

In a similar field of endeavor AAPA discloses an artificial compound eye using a microlens array and its application to scale-invariant processing. In addition, AAPA discloses wherein the individual microlenses are disposed on a base which has a

convex or concave configuration and hence enable different inclinations of the optical axes (figure 1 discloses microlenses in a convex configuration as shown in the article "an artificial compound eye using a microlens array and its application to scale-invariant processing").

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kato by specifically providing wherein the individual microlenses are disposed on a base which has a convex or concave configuration and hence enable different inclinations of the optical axes, as taught by AAPA, for the purpose of creating an artificial eye.

Regarding claim 7, Kato in view of Takahashi and further in view of Mates discloses everything claimed as applied above (see claim 1), however, Kato fails to disclose wherein the detectors are disposed on a base which has a convex or concave configuration.

However, AAPA discloses wherein the detectors are disposed on a base which has a convex or concave configuration (figure 1 discloses reception cells in a convex configuration, as shown in the article "an artificial compound eye using a microlens array and its application to scale-invariant processing").

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kato by specifically providing wherein the detectors are disposed on a base which has a convex or concave configuration, as taught by AAPA, for the purpose of creating an artificial compound eye.

Regarding claim 20, Kato in view of Takahashi and further in view of Mates discloses everything claimed as applied above (see claim 1), however, Kato fails to disclose wherein pinhole diaphragms are disposed behind the microlenses and directly in front of the detectors and are positioned such that at least one pinhole diaphragm is assigned to each microlens.

In a similar field of endeavor AAPA discloses an optical sensor array in an artificial compound eye. In addition AAPA discloses disclose wherein pinhole diaphragms are disposed behind the microlenses and directly in front of the detectors and are positioned such that at least one pinhole diaphragm is assigned to each microlens (Section 2 of the article "Optical sensor array in an artificial compound eye" discloses an optical sensor which consists of a microlens, a pinhole, and a photodetector).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kato by specifically providing wherein pinhole diaphragms are disposed behind the microlenses and directly in front of the detectors and are positioned such that at least one pinhole diaphragm is assigned to each microlens, as taught by AAPA, for the purpose of creating an artificial compound eye.

Regarding claim 21 Kato in view of Takahashi in view of Mates in view of AAPA discloses everything claimed as applied above (see claim 20), however, Kato fails to disclose wherein the ratio of the active surface area of the detector to the active surface area of the microlens is adjustable in order to fix light strength and resolution power through the pinhole diaphragm.

However, AAPA discloses wherein the ratio of the active surface area of the detector to the active surface area of the microlens is adjustable in order to fix light strength and resolution power through the pinhole diaphragm (figure 4a of the article "Optical sensor array in an artificial compound eye" discloses a plurality of pinhole diameters which can be used based on the desired angular sensitivity).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kato by specifically providing wherein the ratio of the active surface area of the detector to the active surface area of the microlens is adjustable in order to fix light strength and resolution power through the pinhole diaphragm, as taught by AAPA, for the purpose of varying the angular sensitivity while preventing wavelength aberrations from distorting the image.

Regarding claim 22, Kato in view of Takahashi in view of Mates in view of AAPA discloses everything claimed as applied above (see claim 20), however Kato fails to disclose wherein the pinhole diaphragms have a diameter in the range of about 1 to 10 um.

However, AAPA discloses wherein the pinhole diaphragms have a diameter in the range of about 1 to 10 um (figure 4a of the article "Optical sensor array in an artificial compound eye" discloses pinhole diaphragms in the range of 0.22 to 10 um).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kato by specifically providing wherein the pinhole diaphragms have a diameter in the range of about 1 to 10 um, as taught by

AAPA, for the purpose of varying the angular sensitivity while preventing wavelength aberrations from distorting the image.

Regarding claim 23, Kato in view of Takahashi in view of Mates in view of AAPA discloses everything claimed as applied above (see claim 20), however Kato fails to disclose wherein the pinhole diaphragm is produced from a metal or polymer coating or combinations thereof.

However, AAPA discloses wherein the pinhole diaphragm is produced from a metal or polymer coating or combinations thereof (section 4.2 of the article "Optical sensor array in an artificial compound eye" discloses that the pinhole array is fabricated using chromium).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kato by specifically providing wherein the pinhole diaphragm is produced from a metal or polymer coating or combinations thereof, as taught by AAPA, for the purpose of creating an artificial compound eye.

4. Claims 8, 11-13, 19 and 27-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kato in view of Takahashi in view of Mates and further in view of Miyatake et al. (United States Patent Application Publication 2006/0072029), hereinafter referenced as Miyatake.

Regarding claim 8 Kato in view of Takahashi and further in view of Mates discloses everything claimed as applied above (see claim 1), however, Kato fails to disclose wherein the optical channels are free of off-axis aberrations for different inclinations of the optical axes.

However, in a similar field of endeavor Miyatake discloses an image input device. In addition Miyatake discloses wherein the optical channels are free of off-axis aberrations for different inclinations of the optical axes (figure 1 discloses partition walls, 2, which block each optical channel from light from other optical channels which would act as off axis-aberrations).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kato by specifically providing wherein the optical channels are free of off-axis aberrations for different inclinations of the optical axes, as taught by Miyatake, for the purpose of eliminating stray light from neighboring optical channels thereby producing a more accurate image.

Regarding claim 11, Kato in view of Takahashi and further in view of Mates discloses everything claimed as applied above (see claim 1), however, Kato fails to disclose wherein a number of optical channels is in the range of about 10 x 10 to 1000 x 1000.

However, Miyatake discloses wherein a number of optical channels is in the range of about 10 x 10 to 1000 x 1000 (the table of paragraph 41 discloses that the number of microlenses in the array is 10 x 10. Each optical channel contains a single microlens).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kato by specifically providing wherein a number of optical channels is in the range of about 10 x 10 to 1000 x 1000, as taught by

Miyatake, for the purpose of creating an image sensor large enough to be used in a digital camera.

Regarding claim 12, Kato in view of Takahashi and further in view of Mates discloses everything claimed as applied above (see claim 1), however, Kato fails to disclose wherein a size of the optical channels is in the range of about 10 microns x 10 microns to 1 mm x 1 mm.

However, Miyatake discloses wherein a size of the optical channels is in the range of about 10 microns x 10 microns to 1 mm x 1 mm (the pitch of the microlens is 499 micron x 499 micron. This is the approximate size of the optical channel. The 499 micron x 499 micron size of the optical channels is in the range of about 10 microns x 10 microns to 1 mm x 1 mm as disclosed at the table of paragraph 41).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kato by specifically providing wherein a size of the optical channels is in the range of about 10 micron x 10 micron to 1 mm x 1 mm, as taught by Miyatake, for the purpose of creating a sensor array which can contain a large number of pixels while maintaining a small footprint.

Regarding claim 13 Kato in view of Takahashi and further in view of Mates discloses everything claimed as applied above (see claim 1), however Kato fails to disclose wherein the regular arrangement of the optical channels are packed tightly in at least one of: (i) a square, (ii) a hexagon, and (iii) a rotational-symmetrical arrangement.

However, Miyatake discloses wherein the regular arrangement of the optical channels are packed tightly in at least one of: (i) a square, (ii) a hexagon, and (iii) a

rotational-symmetrical arrangement (figure 1 exhibits a square configuration of 10 x 10 microlenses as disclosed in the table of paragraph 41).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kato by specifically providing wherein the regular arrangement of the optical channels are packed tightly in at least one of: (i) a square, (ii) a hexagon, and (iii) a rotational-symmetrical arrangement, as taught by Miyatake, for the purpose of arraying the optical channels in an arrangement which is easily repeatable without the need for open space between the channels.

Regarding claim 15, Kato in view of Takahashi and further in view of Mates discloses everything claimed as applied above (see claim 1), however, Kato fails to disclose wherein the optical channels are optically isolated from each other.

However, Miyatake discloses wherein the optical channels are optically isolated from each other (figure 1 discloses partition walls, 2, which block each optical channel from light from other optical channels which would act as off axis-aberrations).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kato by specifically providing wherein the optical channels are optically isolated from each other, as taught by Miyatake, for the purpose of eliminating stray light from neighboring optical channels thereby producing a more accurate image.

Regarding claim 19, Kato in view of Takahashi and further in view of Mates discloses everything claimed as applied above (see claim 1), however, Kato fails to

disclose wherein the optical channels respectively have a plurality of detectors of one or more different functions.

However, Miyatake discloses wherein the optical channels respectively have a plurality of detectors of one or more different functions (each channel comprises a detecting cell (3a) which has a plurality of regions, each of which detects a different color as disclosed at paragraph 109, lines 1-5 and exhibited in figure 12).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kato by specifically providing wherein the optical channels respectively have a plurality of detectors of one or more different functions, as taught by Miyatake, for the purpose of increasing the resolution of the image without adding more microlenses.

Regarding claim 27, Kato in view of Takahashi and further in view of Mates discloses everything claimed as applied above (see claim 1), however, Kato fails to disclose wherein a plurality of pixels is assigned to each optical channel.

However, Miyatake discloses wherein a plurality of pixels is assigned to each optical channel (each channel comprises a detecting cell (3a) which have a plurality of regions, each of which detects a different color as disclosed at paragraph 109, lines 1-5 and exhibited in figure 12).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify by specifically providing wherein a plurality of pixels is assigned to each optical channel, as taught by Miyatake, for the purpose of increasing the resolution of the image without adding more microlenses.

Regarding claim 28, Kato in view of Takahashi in view of Mates in view of Miyatake discloses everything claimed as applied above (see claim 27), however, Kato fails to disclose wherein a plurality of pixels with different properties or groups of pixels of the same properties are present.

However, Miyatake discloses wherein a plurality of pixels with different properties or groups of pixels of the same properties are present (each channel comprises a detecting cell (3a) which have a plurality of regions, each of which detects a different color and each region needs to consist of at least 1 pixel as disclosed at paragraph 109, lines 1-5 and exhibited in figure 12.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kato by specifically providing wherein a plurality of pixels with different properties or groups of pixels of the same properties are present, as taught by Miyatake, for the purpose of capturing a color image with a high resolution.

Regarding claim 29, Kato in view of Takahashi in view of Mates in view of Miyatake discloses everything claimed as applied above (see claim 27), however, Kato fails to disclose wherein color filters are disposed in front of a plurality of pixels.

However, Miyatake discloses wherein color filters are disposed in front of a plurality of pixels (that each channel comprises a detecting cell (3a) which have a plurality of regions, each of which detects a different color and each region needs to consist of at least 1 pixel and a color filter as disclosed at paragraph 109, lines 1-5 and exhibited in figure 12.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kato by specifically providing wherein color filters are disposed in front of a plurality of pixels, as taught by Miyatake, for the purpose of capturing a color image with a high resolution.

5. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kato in view of Takahashi in view of Mates in view of Meyers (United States Patent 6,141,048), hereinafter referenced as Meyers.

Regarding claim 10, Kato in view of Takahashi and further in view of Mates discloses everything claimed as applied above (see claim 1), however Kato fails to disclose wherein the image recognition system has a constructional length of less than 1 mm.

However, in a similar field of endeavor Meyers discloses a compact image capture device. In addition Meyers discloses wherein the image recognition system has a constructional length of less than 1 mm (each lenslet has a focal length of 0.5 mm which leads to a constructional length of less than 1 mm as disclosed at column 7, line 51.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kato by specifically providing wherein the image recognition system has a constructional length of less than 1 mm, as taught by Meyers, for the purpose reducing material costs.

6. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kato in view of Takahashi in view of Mates in view of Takayama (United States Patent Application Publication 2005/0041134).

Regarding claim 14, Kato in view of Takahashi and further in view of Mates discloses everything claimed as applied above (see claim 1), however, Kato fails to disclose wherein the positions of the microlenses and of the detectors are precisely defined lithographically.

However, in a similar field of endeavor Takayama discloses a solid-state image pickup device. In addition Takayama discloses wherein the positions of the microlenses and of the detectors are precisely defined lithographically protrusion portions are formed to be integrated with the micro-lens array solidly in one process, as disclosed at paragraph 31, lines 3-5, he further discloses that this process is conducted by a lithography technique as disclosed at paragraph 32, lines 3-4. The protrusions define the position of the micro-lens and the detectors).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kato by specifically providing wherein the positions of the microlenses and of the detectors are precisely defined lithographically, as taught by Takayama, for the purpose of keeping manufacturing costs low.

7. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kato in view of Takahashi in view of Mates in view of Miyatake further in view of Takayama.

Regarding claim 16, Kato in view of Takahashi in view of Mates in view of Miyatake discloses everything claimed as applied above (see claim 15), however Kato

fails to disclose wherein the optical isolation is effected by lithographically produced separating walls.

However, Takayama discloses wherein the optical isolation is effected by lithographically produced separating walls the protrusion portions are formed to be integrated with the micro-lens array solidly in one process, as disclosed at paragraph 31, lines 3-5, he further discloses that this process is conducted by a lithography technique as disclosed at paragraph 32, lines 3-4).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kato by specifically providing wherein the optical isolation if effected by lithographically produced separating walls, as taught by Takayama, for the purpose of keeping manufacturing costs low.

8. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kato in view of Takahashi in view of Mates further in view Nagaoka et al. (United States Patent Application Publication 2004/0218283), hereinafter referenced as Nagaoka.

Regarding claim 24, Kato in view of Takahashi in view of Mates discloses everything claimed as applied above (see claim 1), however, Kato fails to disclose wherein the image recognition system has a liquid lens which is pre-connected between image and microlenses in order to adjust the field of view.

In a similar field of endeavor Nagaoka discloses an image capturing device. In addition, Nagaoka discloses wherein the image recognition system has a liquid lens which is pre-connected between image and microlenses in order to adjust the field of view (optical element (10) which is placed in front of image capturing element (41), as

disclosed at paragraph 210, line 3 and exhibited in figure 14. The optical element of the invention is disclosed to comprise of a first liquid member as disclosed at paragraph 7, lines 1-2).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kato by specifically providing wherein the image recognition system has a liquid lens which is pre-connected between image and microlenses in order to adjust the field of view, as taught by Nagaoka, for the purpose of providing zoom magnification while minimizing the number of mechanical parts.

9. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kato in view of Takahashi in view of Mates in view of Miyatake further in view of Campbell et al. (United States Patent 7,196,728), hereinafter referenced as Campbell.

Regarding claim 25, Kato in view of Takahashi in view of Mates discloses everything claimed as applied above (see claim 1), however, Kato fails to disclose wherein light sources are disposed on or between the optical channels.

In a similar field of endeavor Campbell discloses an apparatus for displaying images in combination with taking images. In addition Campbell discloses wherein light sources are disposed on or between the optical channels (camera means (14) distributed throughout the display means (12), as disclosed at column 2, lines 24-25 and exhibited in figure 1).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kato by specifically providing wherein light sources are disposed on or between the optical channels, as taught by Campbell, for

the purpose of creating a electronic window in which a person can stand on either side of the apparatus and see what is on the other side.

10. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kato in view of Takahashi in view of Mates in view of Miyatake and further in view of Maruyama (United States Patent Application Publication 2006/0006438).

Regarding claim 30, Kato in view of Takahashi in view of Mates in view of Miyatake discloses everything claimed as applied above (see claim 27), however, Kato fails to disclose wherein a plurality of similar pixels at a greater spacing is disposed in an optical channel in order to increase the light strength without loss of resolution.

Maruyama teaches increasing the spacing of photosensitive elements as you move away from the center of the image (figure 3 exhibits pixels 110 which are gradually spaced closer towards the edge of the image in order to capture light which would otherwise be lost on the edges of the image as disclosed at paragraph 49).

Maruyama is a similar or analogous system to the claimed invention as evidenced Maruyama teaches improving the sensitivity of a plurality of pixels wherein the design incentive of capturing more light with the same number of pixels (as compared to using an equal spacing for all pixels regardless of position) would have prompted a predictable variation of Kato in view of Mates in view of Miyatake by applying Maruyama's known principal of increasing the spacing between photosensitive elements.

In view of the design incentives of capturing more light with the same number of pixels would have implemented the claimed variation of the prior art system of Maruyama.

Therefore, the claimed subject matter would have been obvious to a person having ordinary skill in the art at the time the invention was made.

11. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kato in view of Takahashi in view of Mates in view of Miyatake and further in view of Tangen et al. (United States Patent 6,765,617), hereinafter referenced as Tangen.

Regarding claim 31, Kato in view of Takahashi in view of Mates in view of Miyatake discloses everything claimed as applied above (see claim 27), in addition Kato in view of Takahashi in view of Miyatake discloses a plurality of pixels per optical channel is disposed (see claim 27). However Kato fails to disclose that the optical axes of at least two optical channels intersect in one object spot in order to enable a stereoscopic 3D photograph and/or a distance measurement.

In a similar field of endeavor Tangen discloses an optoelectronic camera. In addition Tangen discloses the optical axes of at least two optical channels intersect in one object spot in order to enable a stereoscopic 3D photograph and/or a distance measurement (parallax is present in the camera, which uses microlenses (L) figure 2, as disclosed at column 14 lines 40-43).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kato by specifically providing that the optical axes of at least two optical channels intersect in one object spot in order to enable a

stereoscopic 3D photograph and/or a distance measurement, as taught by Tangen, for the purpose of measuring the distance of an object.

12. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kato in view of Takahashi in view of Mates in view of Miyatake and further in view of Sasano et al. (United States Patent 5,466,926), hereinafter referenced as Sasano.

Regarding claim 32, Kato in view of Takahashi in view of Mates in view of Miyatake discloses everything claimed as applied above (see claim 27), however Kato fails to disclose wherein dispersive elements for colour photos are disposed in front of or on the microlenses.

However, in a similar field of endeavor Sasano discloses colored microlens array. In addition Sasano discloses wherein dispersive elements for colour photos are disposed in front of or on the microlenses (colored microlenses 31, 32, and 33, as disclosed at column 6, line 42 and exhibited in figure 2A).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kato by specifically providing wherein dispersive elements for colour photos are disposed in front of or on the microlenses, as taught by Sasano, for the purpose of capturing color images.

13. Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kato in view of Takahashi in view of Mates in view of Miyatake and further in view of Crosby (United States Patent Application Publication 2004/0201890), hereinafter referenced as Crosby.

Regarding claim 33, Kato in view of Takahashi and further in view of Mates discloses everything claimed as applied above (see claim 27), however Kato fails to disclose wherein differently orientated gratings or structured polarization filters are disposed in front of similar pixels of an optical channel in order to adjust the polarization sensitivity.

However, in a similar field of endeavor Crosby discloses a microlens including wire-grid polarizer. In addition Crosby discloses wherein differently orientated gratings or structured polarization filters are disposed in front of similar pixels of an optical channel in order to adjust the polarization sensitivity (wire-grid polarizers (16 and 18) on top of microlens (12), as disclosed at paragraph 13, line 1 and exhibited in figure 2).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kato by specifically providing wherein differently orientated gratings or structured polarization filters are disposed in front of similar pixels of an optical channel in order to adjust the polarization sensitivity, as taught by Crosby, for the purpose of maintaining polarization of light.

14. Claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kato in view of Takahashi in view of Mates in view of Mizuguchi et al. (United States Patent 5,543,942), hereinafter referenced as Mizuguchi.

Regarding claim 34, Kato in view of Takahashi in view of Mates discloses everything claimed as applied above (see claim 1), however Kato fails to disclose wherein the image recognition system is combined with at least one liquid crystal element.

However, in a similar field of endeavor Mizuguchi discloses an LCD microlens substrate. In addition Mizuguchi discloses wherein the image recognition system is combined with at least one liquid crystal element (liquid crystal layer (6) and lens sections (2), as disclosed at column 6, lines 12 and 23 and exhibited in figure 1).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kato by specifically providing wherein the image recognition system is combined with at least one liquid crystal element, as taught by Mizuguchi, for the purpose of providing a liquid crystal display element.

15. Claims 35, 36 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baharav et al. (United States Patent 7,274,808), hereinafter referenced as Baharav, in view of Kato in view of Takahashi and further in view of Mates.

Regarding claim 35, Baharav discloses an image recognition system which is an integral component in a flatly-constructed small appliance taken from the group consisting of clocks, notebooks, PDAs or organizers, mobile telephones, spectacles or clothing items (figure 13B exhibits a mobile telephone with an imaging system exhibited in claim 5 as disclosed at column 14 lines 8-39).

Kato in view of Takahashi and further in view of Mates discloses the image recognition system according to claim 1 (see claim 1 above).

Baharav discloses a device which differed from the claimed invention by substation of the disclosed image sensor for the image sensor according to claim 1. Kato in view of Takahashi and further in view of Mates discloses the image recognition system according to claim 1 and their functions were known in the art for allowing in a reduction

of the space in the device which the imaging sensor consumes. The image sensor disclosed by Baharav could have been substituted with the image sensor according to claim 1 and the results would have been predictable and resulted in a device which has a smaller form factor.

Therefore, the claimed subject matter would have been obvious to one of ordinary skill in the art at the time the invention was made.

Regarding claim 36, Baharav discloses an image recognition system which operates to monitor security technology and for checking and implementing access or use authorization (figure 13B exhibits a mobile telephone with an imaging system exhibited in claim 5 which is used for allowing access to the device based on a user's fingerprint as disclosed at column 13 lines 25-42).

Kato in view of Takahashi and further in view of Mates discloses the image recognition system according to claim 1 (see claim 1 above).

Baharav discloses a device which differed from the claimed invention by substation of the disclosed image sensor for the image sensor according to claim 1. Kato in view of Takahashi and further in view of Mates discloses the image recognition system according to claim 1 and their functions were known in the art for allowing in a reduction of the space in the device which the imaging sensor consumes. The image sensor disclosed by Baharav could have been substituted with the image sensor according to claim 1 and the results would have been predictable and resulted in a device which has a smaller form factor.

Therefore, the claimed subject matter would have been obvious to one of ordinary skill in the art at the time the invention was made.

Regarding claim 41, Baharav discloses an image recognition system which is an integrated in equipment used for at least one of iris recognition, fingerprint recognition, object recognition and movement detection (figure 13B exhibits a mobile telephone with an imaging system exhibited in claim 5 which is used for allowing access to the device based on a user's fingerprint as disclosed at column 13 lines 25-42)

Kato in view of Takahashi and further in view of Mates discloses the image recognition system according to claim 1 (see claim 1 above).

Baharav discloses a device which differed from the claimed invention by substation of the disclosed image sensor for the image sensor according to claim 1. Kato in view of Takahashi and further in view of Mates discloses the image recognition system according to claim 1 and their functions were known in the art for allowing in a reduction of the space in the device which the imaging sensor consumes. The image sensor disclosed by Baharav could have been substituted with the image sensor according to claim 1 and the results would have been predictable and resulted in a device which has a smaller form factor.

Therefore, the claimed subject matter would have been obvious to one of ordinary skill in the art at the time the invention was made.

16. Claims 37 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saito et al. (United States Patent 7,274,808), hereinafter referenced as Saito, in view of Kato in view of Takahashi and further in view of Mates.

Regarding claim 37, Saito discloses an image recognition system which is integrated in a camera in a chip card or credit card (paragraph 30 discloses sensor pad 110 on card 100 which is used to capture fingerprint data as exhibited in figure 1).

Kato in view of Takahashi and further in view of Mates discloses the image recognition system according to claim 1 (see claim 1 above).

Saito discloses a device which differed from the claimed invention by substation of the disclosed image sensor for the image sensor according to claim 1. Kato in view of Takahashi and further in view of Mates discloses the image recognition system according to claim 1 and their functions were known in the art for allowing in a reduction of the space in the device which the imaging sensor consumes. The image sensor disclosed by Saito could have been substituted with the image sensor according to claim 1 and the results would have been predictable and resulted in a device which has a smaller form factor.

Therefore, the claimed subject matter would have been obvious to one of ordinary skill in the art at the time the invention was made.

Regarding claim 38, Saito discloses an image recognition system which is integrated in equipment used for medical technology (paragraphs 141, 148 and 166 discloses the smart card 100 used as a way of technologically storing pertinent medical information securely).

Kato in view of Takahashi and further in view of Mates discloses the image recognition system according to claim 1 (see claim 1 above).

Saito discloses a device which differed from the claimed invention by substation of the disclosed image sensor for the image sensor according to claim 1. Kato in view of Takahashi and further in view of Mates discloses the image recognition system according to claim 1 and their functions were known in the art for allowing in a reduction of the space in the device which the imaging sensor consumes. The image sensor disclosed by Saito could have been substituted with the image sensor according to claim 1 and the results would have been predictable and resulted in a device which has a smaller form factor.

Therefore, the claimed subject matter would have been obvious to one of ordinary skill in the art at the time the invention was made.

17. Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over Campbell et al. (United States Patent 2005/0061951), hereinafter referenced as Campbell, in view of Kato in view of Takahashi and further in view of Mates.

Regarding claim 39, Campbell discloses an image recognition system which monitors tasks in the interior and exterior of vehicles (paragraph 39 discloses use of an image sensor in a vehicle navigation system).

Kato in view of Takahashi and further in view of Mates discloses the image recognition system according to claim 1 (see claim 1 above).

Campbell discloses a device which differed from the claimed invention by substation of the disclosed image sensor for the image sensor according to claim 1. Kato in view of Takahashi and further in view of Mates discloses the image recognition system according to claim 1 and their functions were known in the art for allowing in a reduction

of the space in the device which the imaging sensor consumes. The image sensor disclosed by Campbell could have been substituted with the image sensor according to claim 1 and the results would have been predictable and resulted in a device which has a smaller form factor.

Therefore, the claimed subject matter would have been obvious to one of ordinary skill in the art at the time the invention was made.

18. Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schneider et al. (United States Patent 7,274,808), hereinafter referenced as Schneider, in view of Kato in view of Takahashi and further in view of Mates.

Regarding claim 40, Schneider discloses an image recognition system which is integrated in equipment used for intelligent cockpit monitoring in the aircraft industry (column 8 lines 27-33 disclose use of cameras in a system for monitoring a cockpit of an aircraft).

Kato in view of Takahashi and further in view of Mates discloses the image recognition system according to claim 1 (see claim 1 above).

Saito discloses a device which differed from the claimed invention by substation of the disclosed image sensor for the image sensor according to claim 1. Kato in view of Takahashi and further in view of Mates discloses the image recognition system according to claim 1 and their functions were known in the art for allowing in a reduction of the space in the device which the imaging sensor consumes. The image sensor disclosed by Saito could have been substituted with the image sensor according to

claim 1 and the results would have been predictable and resulted in a device which has a smaller form factor.

Therefore, the claimed subject matter would have been obvious to one of ordinary skill in the art at the time the invention was made.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JASON A. FLOHRE whose telephone number is (571)270-7238. The examiner can normally be reached on Monday to Thursday 8:00 AM to 3:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sinh Tran can be reached on 517-272-7564. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/Sinh Tran/

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/JAF/